37371

VIBRATION TEST EQUIPMENT

OPERATING & SERVICING
INSTRUCTIONS

MODEL 122P
CHARGE AMPLIFIER

S/N 8279-8282

LP Filter 2K

MP MASTER
MA35186

UNHOLTZ-DICKIE
CORPORATION

OPERATING & SERVICING INSTRUCTIONS

MODEL 122P
CHARGE AMPLIFIER

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LP Filter 2K

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CERTIFICATE OF CALIBRATION

This document certifies that the Unholtz-Dickie Model 122P Serial No. 8279-8282 has been calibrated at the factory and met all technical specifications contained in the accompanying manual of Operating and Servicing Instructions at the time of shipment.

DATE OF SHIPMENT: 8/29/86

Mario Fasulo
Calibration Engineer

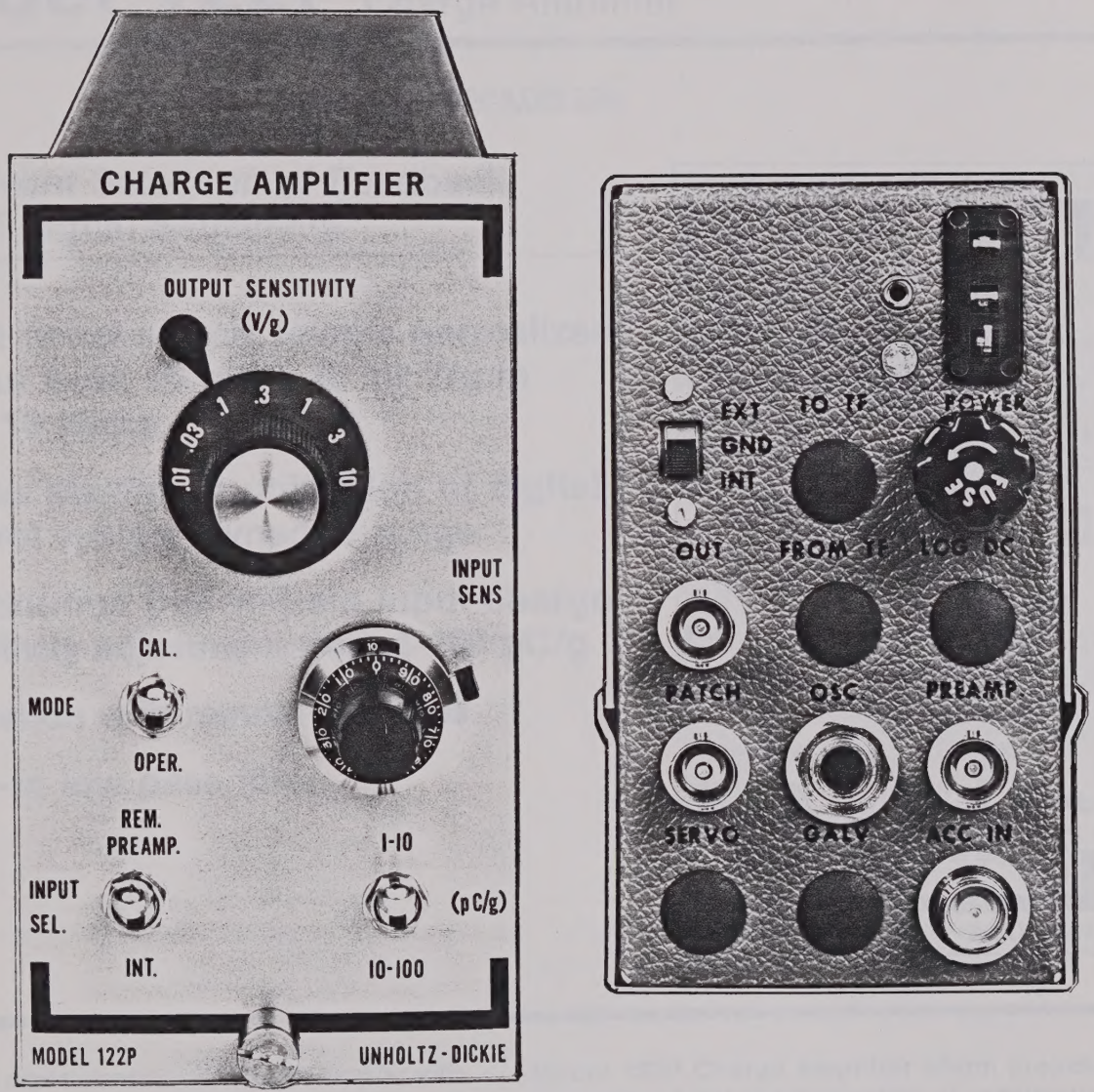

CHARGE AMPLIFIER
OUTPUT SENSITIVITY
(V/g)
.01
.03
.1
.3
1
3
10
INPUT
SENS
CAL.
MODE
OPER.
REM.
PREAMP.
INPUT
SEL.
INT.
1-10
(pC/g)
10-100
MODEL 122P
UNHOLTZ-DICKIE
EXT
GND
INT
TO IF
POWER
FUSE
OUT
FROM IF
LOG DC
PATCH
OSC
PREAMP
SERVO
CALV
ACC IN

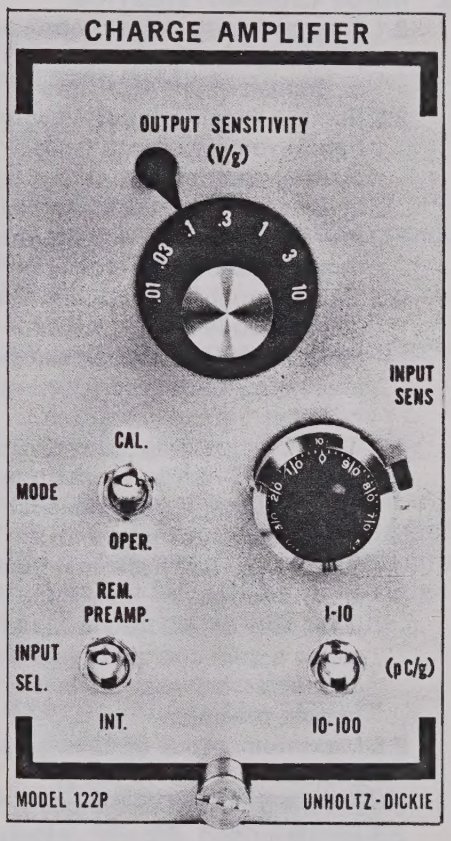
Fig. 1.1

Model 122P Charge Amplifier

1. DESCRIPTION

Convenient Selection of Feedback Control Signal Sensitivity

- **Front panel switch selects normalized output from 10 mV/g to 10 V/g in 1, 3, 10 steps**
- **Allows maximum utilization of digital control system dynamic range**
- **Continuous Dial-A-Gain input charge sensitivity adjustment from 1-100 pC/g**
- **Operation with remote preamps**
- **Plug-in low pass filter**



Users of digital control systems are familiar with the operating restrictions that can be encountered when using the standard 10 mV/g normalized output available from most charge amplifiers. In many cases, performance of the digital control system is affected significantly by the feedback signal level. For a shock spectrum test, a 10 mV/g acceleration signal may be desirable to accommodate the typically high acceleration levels generated, without exceeding the dynamic range of the digital controller. Conversely for low level tests, optimum control may require a considerably higher acceleration normalization (100 mV/g, 1000 mV/g or greater) in order to meet the loop gain criteria of the digital control system.

These commonly encountered control system requirements now can be addressed using the Model 122P Charge Amplifier which provides convenient front panel selection of acceleration feedback signal sensitivity from .01 to 10 V/g in 1, 3, 10 steps.

The 122P Charge Amplifier utilizes the same basic circuit design as the popular D22 Series Signal Conditioners including extensive use of integrated circuits and rugged, modular construction. Remote charge preamplifiers (U-D Model 22CA-2 or RCA-2TR) can be accommodated by front panel toggle switch selection, bypassing the internal charge converter. A three-pole low-pass Butterworth filter is provided on a sub-plug-in board within the instrument. A calibration mode allows insertion of an external calibration signal through a rear chassis jack. Up to six units can be rack mounted in a 19 inch rack adapter.

2. SPECIFICATIONS
MODEL 122P CHARGE AMPLIFIER

1. GENERAL

1.1 Separate, isolated power supplies are provided in each channel.

1.2 All power and signal connections are made at separate rear mounted connectors.

1.3 Each channel is totally enclosed so that it can be used with equal convenience as a bench mounted or as a rack mounted instrument.

2. INPUT CHARACTERISTICS

2.1 Charge input - direct connection to any piezoelectric transducer with 10 Megohms, or greater, shunt resistance.

2.2 Remote Preamp Input - two-wire connection to remote charge type or voltage type preamp that can be added to the system at anytime. The Preamp connector supplies the required bias voltage/current to the remote preamp.

2.3 Gain Change with Source Capacitance in Charge Mode (INT.) - A source capacitance of 50,000 pF shall cause less than 0.1% gain change for transducers having a sensitivity between 1 and 100 pC/unit.

2.4 Gain Change with Remote Preamp Mode (REM. PRE-AMP) - all instrument gain controls and range switches shall apply when operation is converted to the remote preamp mode. The basic instrument accuracy shall change by less than ± 1%. Up to 2000 feet of RG58/U coaxial cable shall cause a gain change of less than 1% when connected between the instrument and the remote preamp.

2.5 Maximum Input in Charge Mode (INT.)
±15,000 pC (1 to 10 pC/g)
±150,000 pC (10 to 100 pC/g)

2.6 Single-ended accelerometers with input sensitivities from 1-100 pC/g are accommodated by setting a front panel ten-turn precision potentiometer and dial and a two-position front panel input sensitivity range switch.

3. OUTPUT

3.1 At least ±10 V peak into a 1K load. Output impedance is less than 50 ohms.

3.2 Output sensitivities of .01, .03, .1, .3, 1, 3 and 10 V/g may be set by a seven position front panel switch.

4. FREQUENCY RESPONSE

4.1 With low-pass filter "plug-in" removed:
±1% 10 Hz to 10 kHz
±5% 2 Hz to 30 kHz

4.2 The low-pass filter "plug-in" supplied is a 3-pole Butterworth filter. Filter frequency f_o can be supplied in a 1, 2, 5, 10 sequence from 50 Hz to 10 kHz. Response at f_o is ±2% and at 2 f_o is −3 ±1 dB, with 18 dB/octave attenuation rate.

5. CALIBRATION

A front panel switch allows a voltage calibration signal to be fed into a BNC connector on the rear panel through a 1000 pF ±½% capacitor, thus providing a 1 pC/mV conversion to the charge amplifier.

6. MAXIMUM NOISE

.005 pC rms ± .0015 pC rms/1000 pF source capacitance RTI for 1-10 pC/g range or
.05 pC rms ± .0015 pC rms/1000 pF source capacitance RTI for 10-100 pC/g range plus 1 mV rms RTO.

7. HARMONIC DISTORTION

Less than 0.5%

8. POWER

105 - 125 or 210 - 250 V AC 50/60 Hz 5 VA

9. FRONT PANEL CONTROLS

9.1 Output Sensitivity Switch (.01 to 10 V/g)

9.2 Input Sensitivity Dial (10 turn locking)

9.3 Input Sensitivity Switch (1-10; 10-100 pC/g)

9.4 Input Selector Switch (INTERNAL; REMOTE PREAMP)

9.5 Mode Switch (OPER; CAL)

10. PHYSICAL

10.1 Single Module 2.8W x 5.25H x 12" D

10.2 Six channel rack adapter Model 80RA
19W x 5.25H x 12.5D

10.3 Connectors are all BNC except for ¼" phone jack for patching calibration signal to next channel.

10.4 Weight Single Module: 4 pounds

10.5 Operating Temperature: 40° F to 125° F

UNHOLTZ-DICKIE CORPORATION

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Printed in U.S.A.

Bulletin 122P-81

3. OPERATION

The front panel toggle switches lock and must be pulled outward to switch from one position to the other.

3.1 With Internal Charge Converter

3.1.3 Connect the piezoelectric accelerometer to the ACC IN connector by means of a noise-treated coaxial cable (U-D Part No. 3804-L, 3808-L or other). A Microdot-to-BNC adapter (33-101) may be needed for the ACC IN connector.

3.1.2 Connect the OUT connector to the input of the digital control system or other Monitor/Controller.

3.1.3 Set

MODE		to	OPER
INPUT	SEL.	to	INT
OUTPUT	SENS.	to	desired value
INPUT	SENS.	to	charge sens of accelerometer
GND	(rear panel)	to	position producing minimum noise

3.1.4 Apply AC power to rear connector. Front panel red LED indicator should light.

3.2 With Remote Charge Converter (U-D Model RCA-2TR)

3.2.1 Connect the piezoelectric accelerometer to the input of the remote charge converter by means of a noise-treated coaxial cable. Connect the output of the remote charge converter to the PREAMP connector of the 122P by means of a low-cost coaxial cable (RG-58) terminated with BNC connectors.

3.2.2 Repeat 3.1.2, 3.1.3 and 3.1.4 except that the INPUT SELECTOR should be set to REM. PREAMP.

3.2.3 The current source for the remote charge preamplifier is set for a nominal value of 3.85 mA at the factory which is designed to give 10-14 V DC bias across the output terminals of the UD Model RCA-2TR. To measure this voltage, provide a tee connector at the PREAMP input of the 122P. Adjust PREAMP slowly through the hole on the top of the chassis to adjust the bias voltage if necessary.

3.3 Calibration Check

3.3.1 Apply 1.000 V rms, 100 Hz, to PATCH

Set

OUTPUT	SENS.	to .01 V/g
INPUT	SENS.	to 10 pC/g
MODE		to CAL.
INPUT	SEL	to desired input

3.3.2 Apply AC power and measure the voltage at OUT. It should be 1.000 V rms ±1%. Adjust CAL through the hole on the top of the chassis if desired.

3.3.3 With two or more Model 122P in a Model 80RA Rack Adapter it is possible to "daisy chain" the calibration oscillator signal from unit to unit by connecting the OSC jack of one unit to the PATCH connector of the next, and so forth.

4. CALIBRATION-CHECKOUT

The following procedures give a detailed checkout procedure which is helpful in troubleshooting the Model 122P. Sections 3.2.3 and 3.3 are often sufficient for a periodic calibration check.

4.1 Instruments and Connections Required

Oscilloscope	HP 1205B
AC Voltmeter (ACVM)	Keithley 179 TRMS DMM
Signal Oscillator (OSC)	Krohnhite 4100R
Ratio Transformer (RT)	Ailtech (Singer) RT-20R (desirable)

The RT is useful for producing accurate input voltages when excited by a 1.000 V rms source. All voltages measured with the ACVM should be viewed with the CRO. Connect the OSC to the PATCH connector through the RT.

4.2 SENS. DIAL, RANGE Accuracy

4.2.1 Instrument Settings:

OUT. SENS.	to	.1 V/g
MODE	to	CAL
INPUT SEL	to	both positions
GND	to	INT.
CAP (do not short)		ACC IN connector
Remove top cover.		

4.2.2 Table 4.1 gives the required input voltage at the PATCH connector, corresponding SENS DIAL and RANGE settings for required OUTPUT voltage (100 Hz).

PATCH INPUT (mV rms)	SENS	OUTPUT (V rms)	ADJUST
100.0	10 (1-10)	1.000 ±1%	CAL
10.00	1 (1-10)	1.000 ±1%	LO (Note 2)
1000.	100 (10-100)	1.000 ±1%	Consult factory (Note 1)

Note 1 Shunting capacitors on Card A or resistors on the front panel switches is required depending on position of INPUT SELECTOR.

Note 2 Repeating first and second lines may be necessary.

Table 4.1 SENS. DIAL - RANGE Calibration

4.3 OUTPUT SENS. Accuracy

4.3.1 Instrument Settings:

Same as 4.2.1 except
OUT SENS is varied
INPUT SENS is 10 pC/g (1-10 range)

4.3.2 Table 4.2 gives required input voltage at the PATCH connector for 1.000 V rms ±1% at the OUTPUT connector for various OUTPUT SENSITIVITY settings.

PATCH INPUT (mV rms 100 Hz)	1000	333.3	100.0	33.33	10.00	3.333	1.000
OUTPUT SENS. (V/g)	.01	.03	.1	.3	1	3	10

1.000 V rms ±1% at OUT

Table 4.2 OUT SENS Accuracy

4.4 Frequency Response - LP Filter In

4.4.1 Apply 100 mV rms to PATCH
Instrument Settings as in 4.2.1.
INPUT SENS to 10 pC/g (1-10 range)

4.4.2 Table 4.3 gives allowable response deviations vs. frequency. Output voltage is 1.000 V rms.

FREQ (Hz)	2	10	100	(½ fo) 25 kHz	(fo) 40 kHz
OUTPUT VOLT 1.000 V rms	±5%	±1%	±1%	±1%	±2%

Table 4.3 Frequency Response
10 kHz LP Filter

4.5 Maximum Output

Change OUT SENS to 1 V/g from settings in 4.4.1 and increase input voltage (100 Hz) until clipping is observed. OUTPUT voltage should be larger than 10 V rms (typically 13 V rms).

4.6 Noise - (10 kHz LP Filter In)

4.6.1 Instrument Settings:

OUT SENS to 10 V/g
INPUT SENS to 1 pC/g (1-10) range
INPUT SEL to INT.
MODE to OPER.
GND to INT.
Cap (do not short) ACC IN Connector.

4.6.2 Measured wideband noise at OUT connector should be less than 50 mV rms. Power frequency components may be barely discernible on the CRO but should be small.

5. MAINTENANCE - SERVICING

5.1 CIRCUIT DIAGRAMS

The overall circuit schematic in Fig. 6.1 showing signal flow directions, and the detailed card layouts in Section 6 should be used with signal tracing techniques to pinpoint any problems. The checkout and calibration procedures in Section 4 are valuable aids for locating problems.

5.2 ACCESS FOR SERVICING

Removal of the top cover by means of the three screws exposes all adjustment potentiometers and printed circuit cards except for Card A. The frequently used adjustments (CAL, PREAMP) are available through access holes in the top cover. All cards can be removed by pulling them out of the connectors. ALL PRINTED CIRCUIT CARDS SHOULD BE REMOVED AND REPLACED WITH THE POWER OFF.

Removal of the bottom cover by means of six screws exposes all connections to the printed circuit cards.

The shielded charge converter (Card A) is removed by means of the two screws fastening the lower shield to the upper shield. These are accessible only when the bottom cover is removed.

5.3 POWER SUPPLY VOLTAGES

If trouble is suspected, measure the power supply voltages first. The voltages are given in Fig. 6.1.

5.4 LED REPLACEMENT

Replace the front panel LED by unsoldering the connecting wires and pushing it out from the rear. Do not use prying tools from the front, as these may scratch the panel. The new LED is inserted by pushing it from the front with a blunt tool on the lens of the LED.

5.5 COMPONENT REPLACEMENT

Component replacement on a PC card should be a rare occurrence but the following instructions should be followed to prevent damage to the printed circuit.

Should a permanently mounted part require replacement, remove the excess solder at the insertion points with a soldering iron and a desoldering wick (Dri-wick from American Electrical Heater Co.). On a single-sided card, the component can usually be lifted out with long-nose pliers. On a double-sided card with plated-thru holes, however, it is usually necessary to heat each insertion point while pulling on the lead with pliers. Take care not to delaminate the printed-circuit conductors.

There are also specially shaped tools available with soldering iron for removing multi-pin devices from two-sided cards.

5.6 COMPONENT LIST

The following table gives ordering information for integrated circuits, semiconductors, and other critical elements used in the 122P. Other resistors and capacitors are available from many sources.

PART DESIGNATION	MANUFACTURER/ SUPPLIER	DESCRIPTION
1N5394	Westinghouse	Power Diode
2N4919	Motorola	Power PNP
2N4922	Motorola	Power NPN
2N4403	Motorola	PNP
µA723	Fairchild	I.C. Regulator
MP842	Micro-Power Systems	Dual Low-Noise FET
NE531V (RC4531)	Raytheon	Hi-Slew Op Amp
1N5363	Signetics	FET
LM201AN	Texas Instruments	Op. Amp (±22V)
8WR Helitrim (Various Resistences)	Beckman	P.C. Potentiometers
7276-2K	Beckman	2K Precision Pot.
2606	Beckman	15 Turn Dial
4000-2-001	LEDCO	Red LED
±2%, ±½% Mica Capacitors	Unholtz-Dickie	Precision Mica Capacitor
T-82-D	Unholtz-Dickie	Power Transformer

6. SCHEMATIC-LAYOUTS

Figure	Title	Drawing No.	Rev.
6.0	Chassis Layout		NC
6.1	Circuit Schematic	C12914	B
6.2	Layout - Charge Converter - A		A
6.3	Layout - Dial-A-Gain - B		NC
6.4	Layout - L.P. Filter-Ampl.- C		NC
6.5	Layout - Dual Reg. Power Supply - P		C

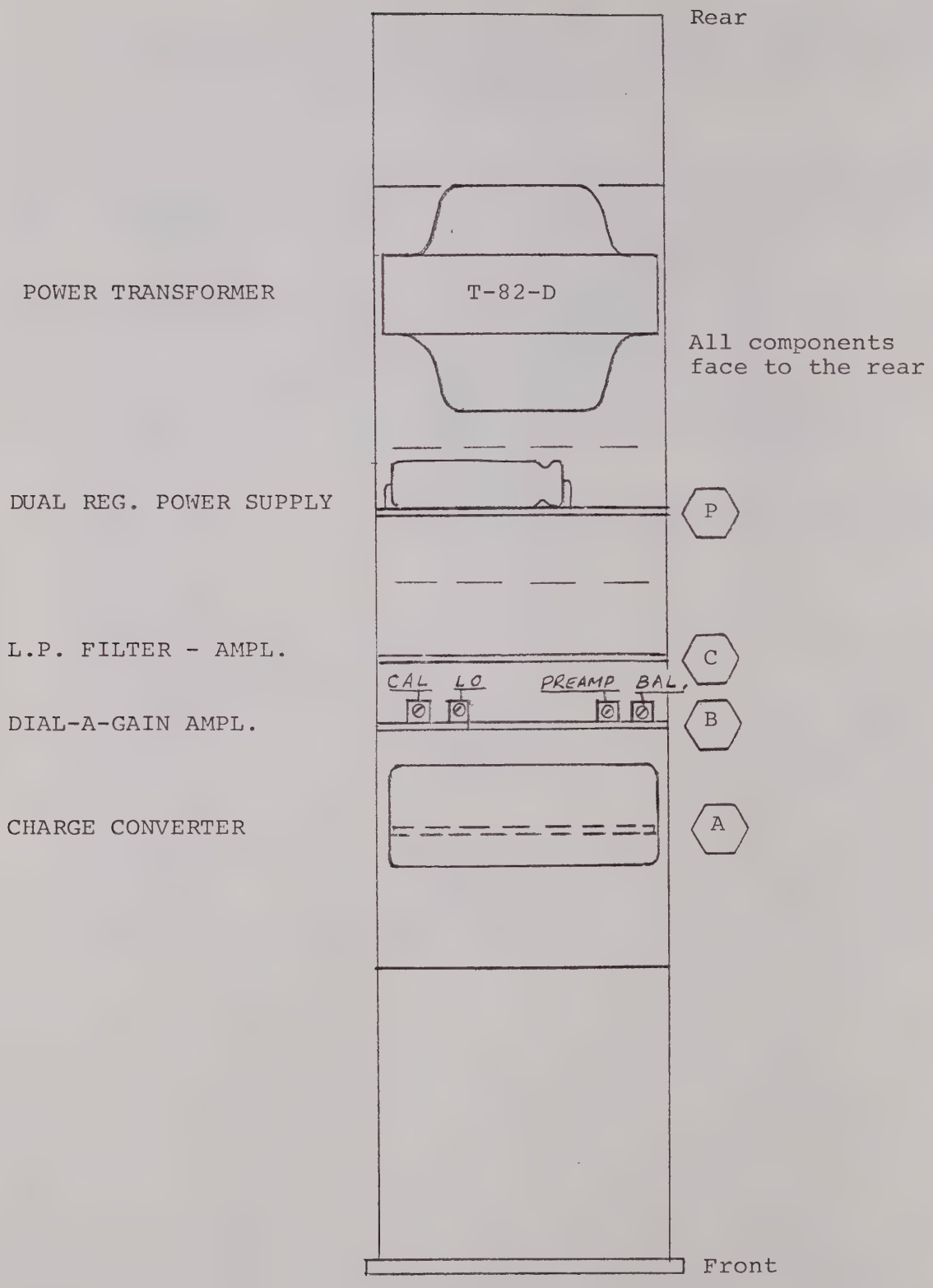
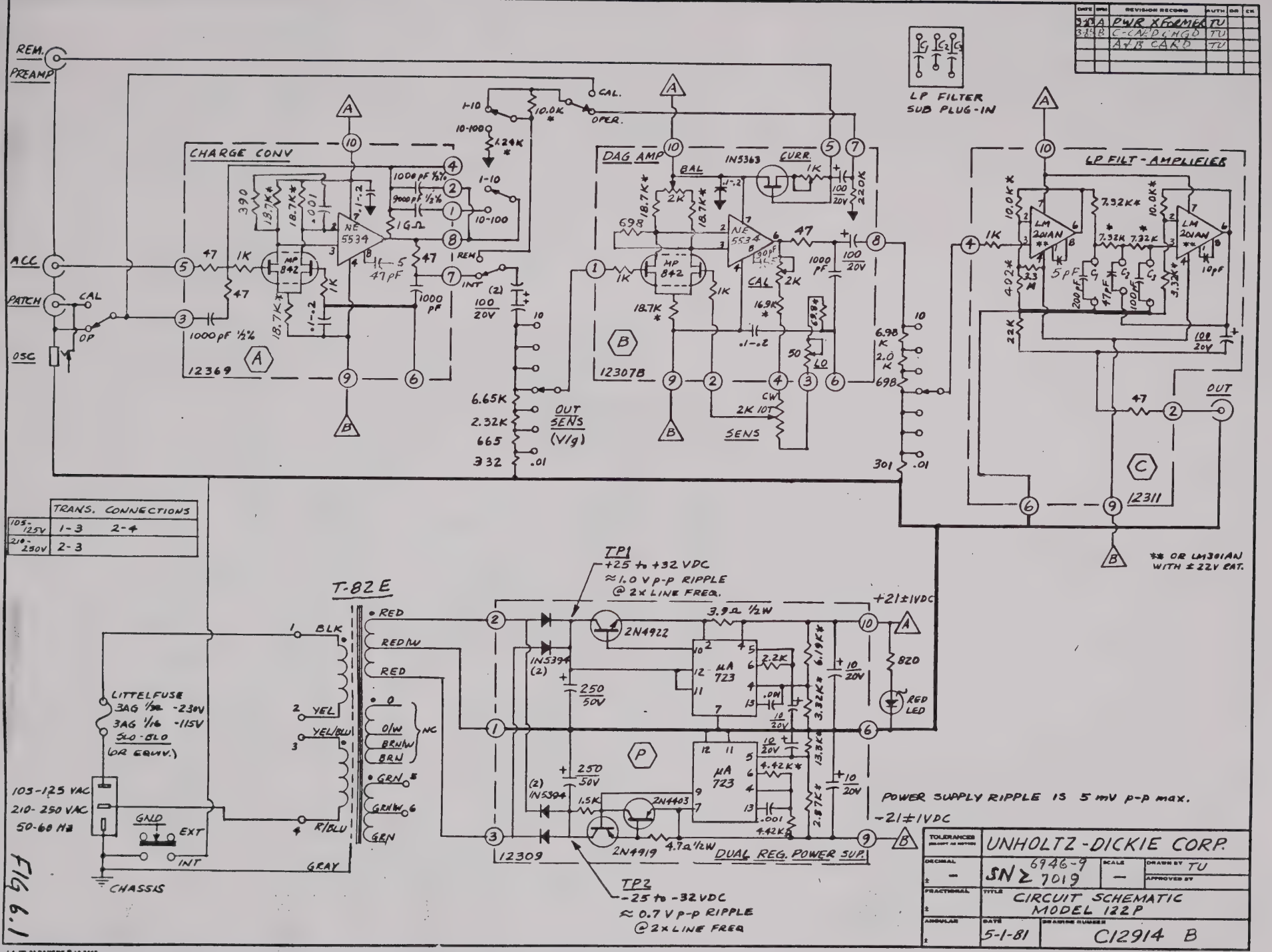
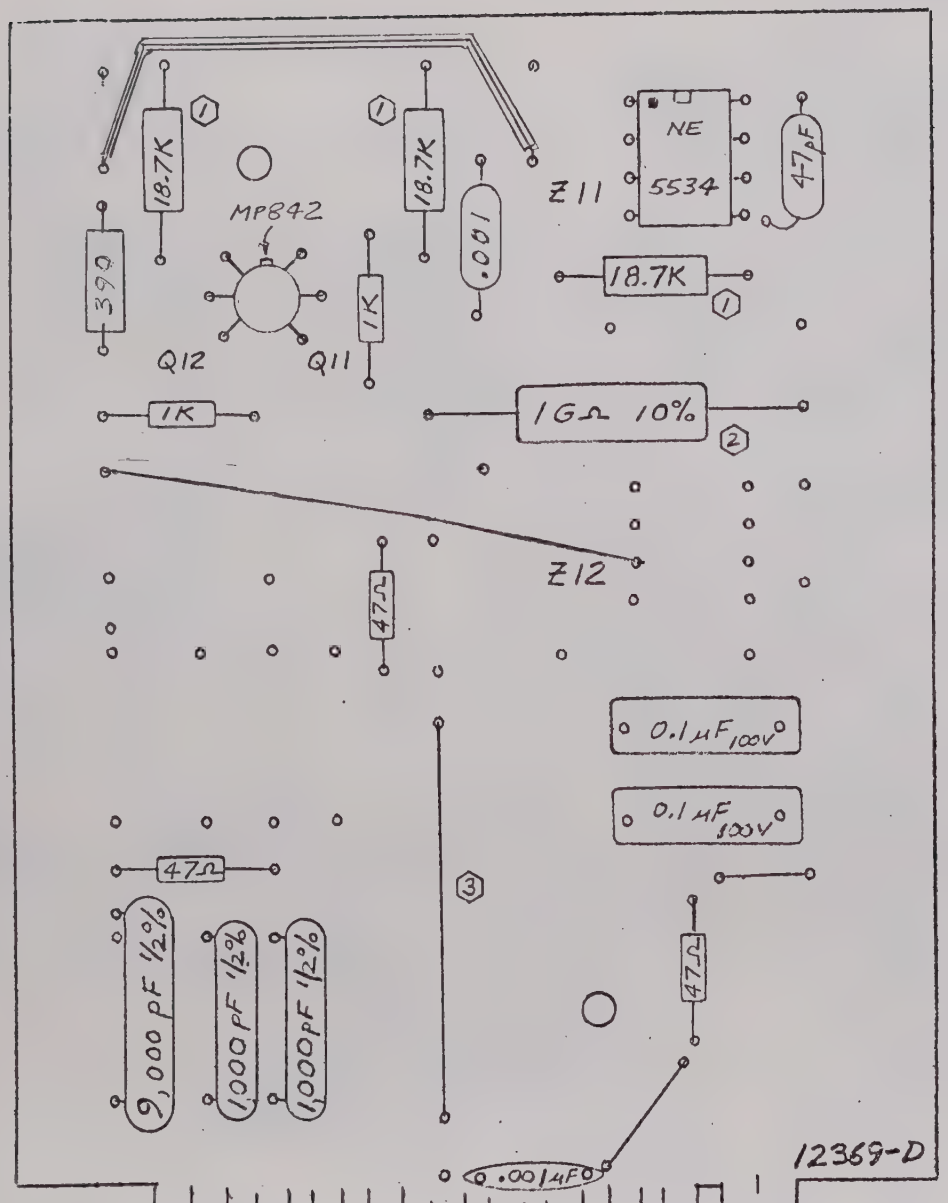


Fig. 6.0
Chassis Layout
Model 122P


REVISION RECORD
A PWR XFORMER TV
B C-CAP CHGD TV
A & B CARD TV
REM.
PREAMP
ACC
PATCH
CAL
OP
OSC
CHARGE CONV
12369
DAG AMP
12307B
CAL.
OPER.
1-10
10-100
REM
INT
(2) 100 20V
OUT SENS (V/g)
6.65K
2.32K
665
332
.01
SENS
2K 10T CW
301
6.98K
2.0K
698
LP FILTER SUB PLUG-IN
LP FILT - AMPLIFIER
LM 201AN **
12311
OUT
** OR LM301AN WITH ± 22V CAT.
TRANS. CONNECTIONS
105-125V 1-3 2-4
210-250V 2-3
T-82E
RED
RED/W
RED
BLK
YEL
YEL/BLU
O
O/W
BRN/W
BRN
GRN
GRN/W
GRN
R/BLU
GRAY
NC
LITTELFUSE
3AG 1/32 -230V
3AG 1/16 -115V
SLO-BLO
(OR EQUIV.)
103-125 VAC
210-250 VAC
50-60 Hz
GND
EXT
INT
CHASSIS
TP1
+25 to +32 VDC
≈1.0 V p-p RIPPLE
@ 2x LINE FREQ.
+21±1VDC
2N4922
IN5394 (2)
μA 723
2N4403
2N4919
4.7Ω 1/2W
3.9Ω 1/2W
820
RED LED
-21±1VDC
POWER SUPPLY RIPPLE IS 5 mV p-p max.
12309
DUAL REG. POWER SUP.
TP2
-25 to -32 VDC
≈ 0.7 V p-p RIPPLE
@2x LINE FREQ
UNHOLTZ-DICKIE CORP.
SN≥ 6946-9 7019
CIRCUIT SCHEMATIC MODEL 122P
5-1-81
C12914 B
Fig 6.1

REV	DATE	DESCRIPTION	BY
A	3-85	NE531 → NE5534 EQUALIZATION CKT. CHGD	TU



① 1% METAL FILM

② 5GΩ FOR -2

③ 2.2μF/100V FOR K OPTION

122P
D22PM

A

	UNHOLTZ-DICKIE CORP
	2×
	COMPONENT LAYOUT CHARGE CONVERTER

FIG 6.2

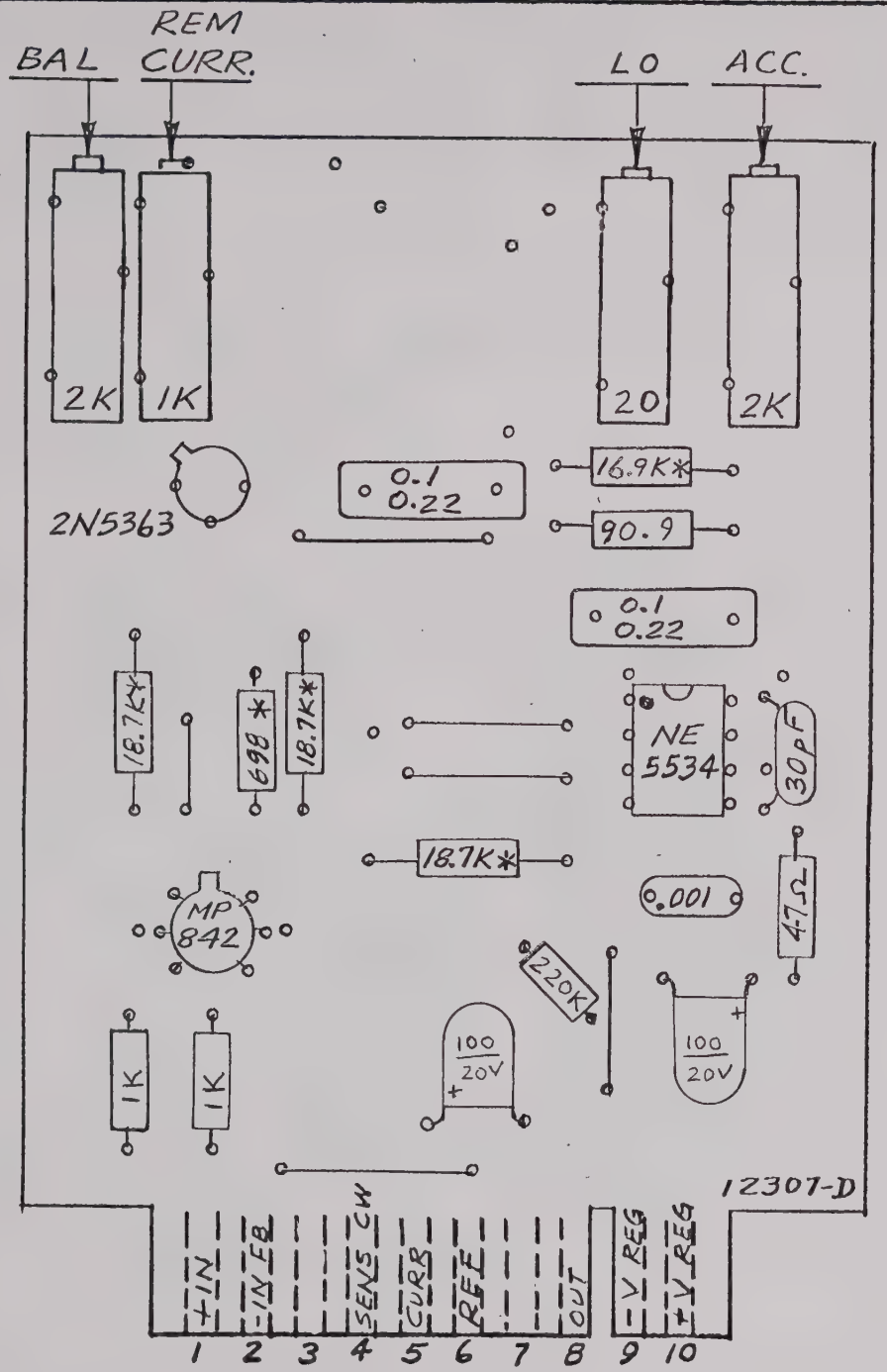


FIG 6.3

REVISIONS			
SYM	DATE	DESCRIPTION	BY

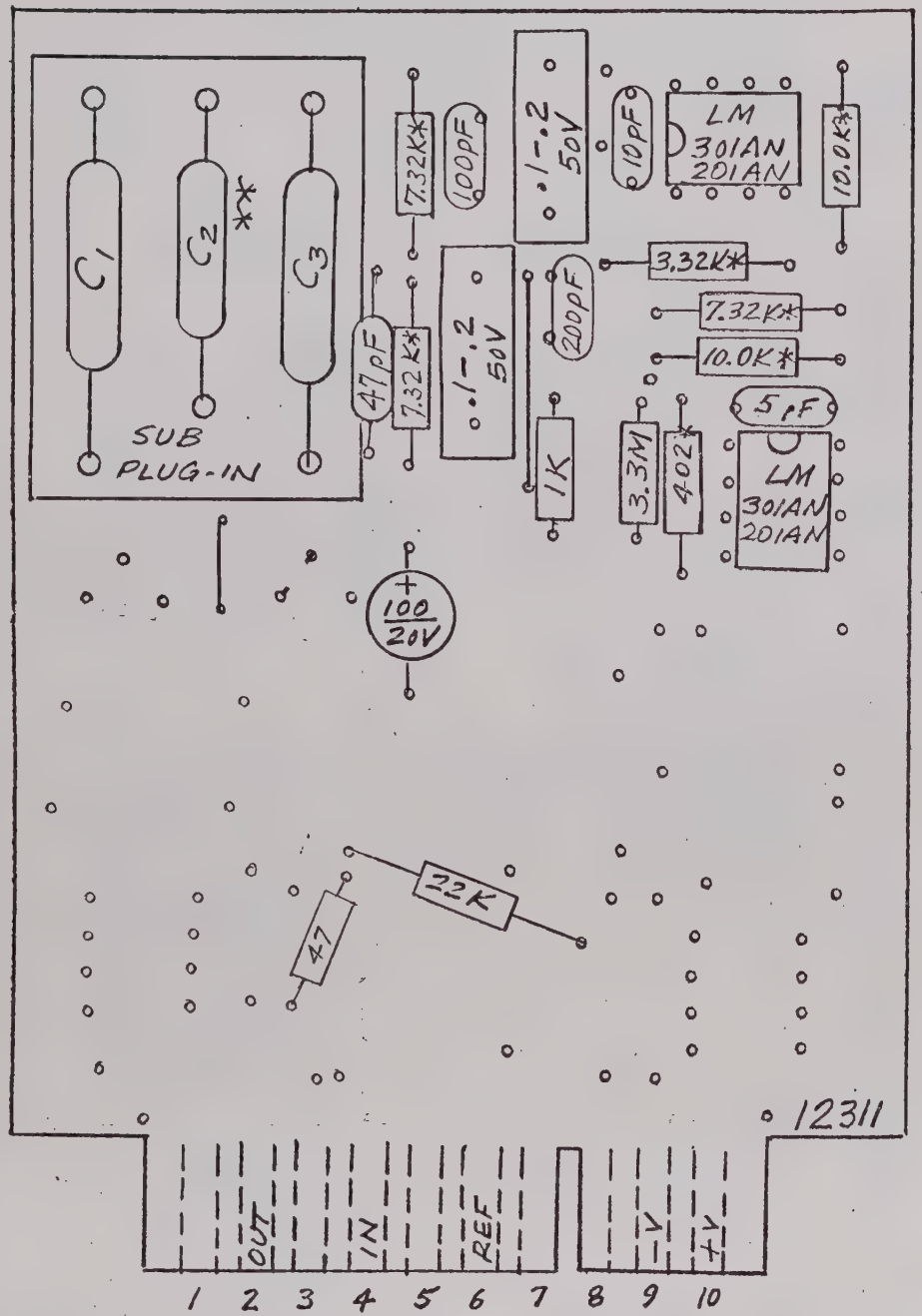
B

UNHOLTZ-DICKIE CORP.

122P SN 7550 & UP

COMPONENT LAYOUT
DIAL-A-GAIN CARD

6-1-85



±2%

		10KHz	
±2%	C_1	2000pF	
±5%	C_2	430pF	
±2%	C_3	1000pF	

LM 301AN / 201AN
(±22V RATING)

* 1% METAL FILM
** PADDED AT FACTORY

SN 6946-9
122P ≥7019

UNHOLTZ-DICKIE CORP

L.P FILTER-AMPL.

C

FIG 6.4

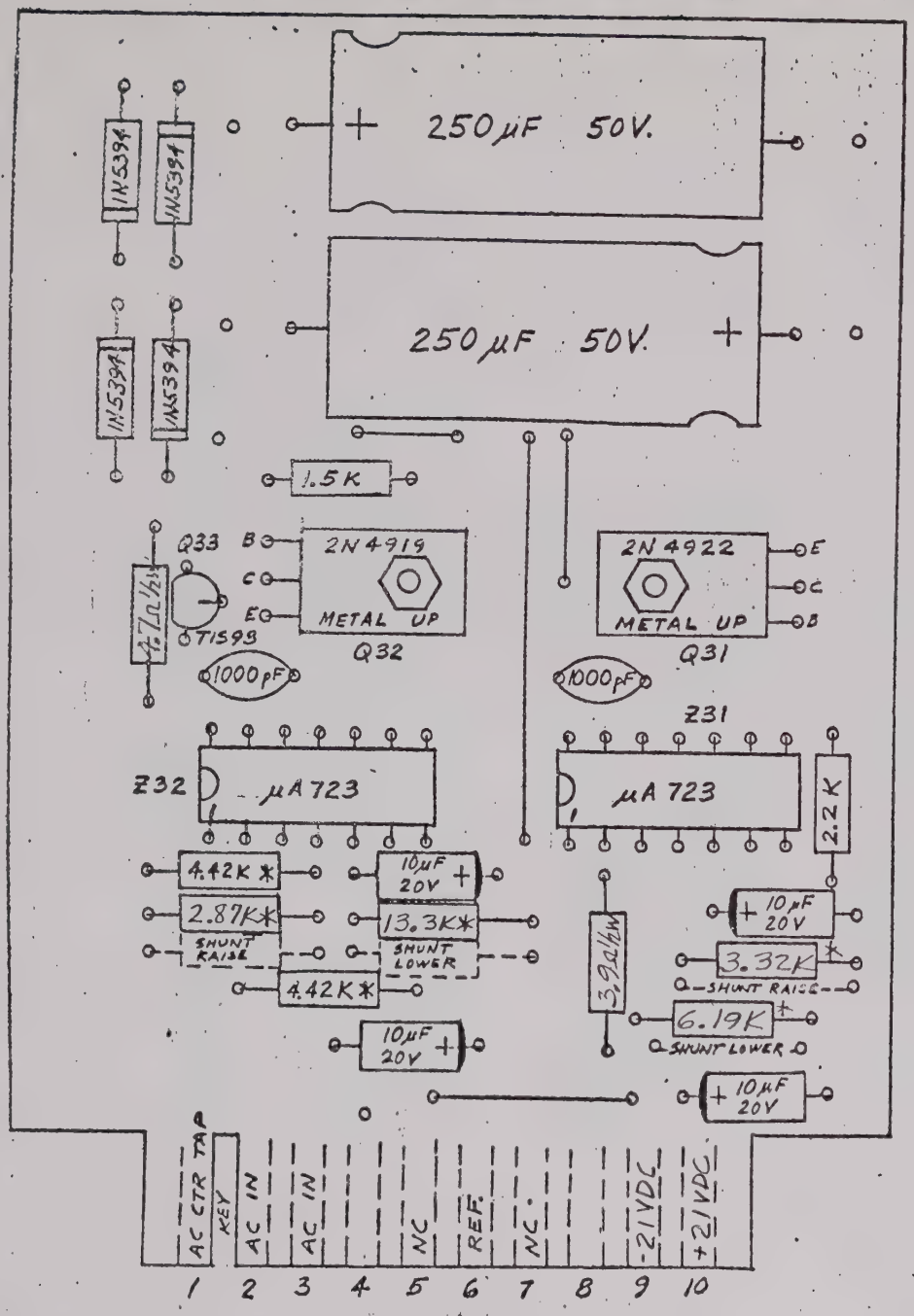


FIG 6.5

MOD 122P
POWER SUPPLY

TOLERANCES EXCEPT AS NOTED	UNHOLTZ-DICKIE CORP
DECIMAL ±	SCALE
	DRAWN BY TU
	APPROVED BY
FRACTIONAL ±	TITLE COMPONENT LAYOUT DUAL REG. POWER SUPPLY
ANGULAR ±	DATE 10-4-74
	DRAWING NUMBER ±21V

UNHOLTZ - DICKIE CORPORATION
Vibration Testing Equipment
6 BROOKSIDE DRIVE
WALLINGFORD, CONN. 06492
(203) 265-3929
TELEX #643802 UD CORP WFOD

WEST COAST OFFICE: (213) 316-0275
1924 SOUTH PACIFIC COAST HWY-SUITE F
REDONDO BEACH, CA 90277

WARRANTY

Digital controllers and associated options are warranted to be free of defects in material and workmanship for a period of 90 days from date of shipment (Extended Coverage available).

All other products are warranted to be free of defects in material and workmanship for a period of one year from date of shipment. If the products are not installed, maintained and used in a normal manner in accordance with instructions and manuals, this warranty will not apply.

This warranty is limited to repairing and replacing parts which have been returned to UNHOLTZ-DICKIE CORP., and in our opinion are defective. Service required to correct defects in material or workmanship will be supplied without charges. The Buyer will pay all transportation and taxes incurred. This warranty does not cover costs incurred by the Buyer as a result of purchase of UNHOLTZ-DICKIE CORP. equipment or any charges for the Buyer's labor for replacement, adjustment or repair unless authorized in advance in writing. We are not liable for consequential damages.

This warranty will not apply to any products which, in the opinion of UNHOLTZ-DICKIE CORP., have been subject to accident, misuse or neglect; altered or repaired with a substitute which might impair the product; or used outside of rated conditions. UNHOLTZ-DICKIE CORP. reserves the right to make improvements in its products including changes and additions without incurring obligations to incorporate such improvements in previous units.

This warranty is expressly in lieu of any and all other warranties or commitments, expressed or implied and any other obligations to the Buyer associated with the use of UNHOLTZ-DICKIE CORP. products.

02-13-86

UNHOLTZ-DICKIE CORPORATION

Incoming Instrument Inspection
and
Return Shipping Instructions

1. Unpacking and Inspection

If the shipping carton is damaged, note on acceptance that it is received damaged and subject to claim when inspected. Ask that the carrier's agent be present when the instrument is unpacked and inspected for damage (scratches, dents, broken knobs, etc.). If the instrument is damaged or fails to meet specifications, notify the carrier and the Unholtz-Dickie Corporation immediately. Retain the shipping carton and the padding material for possible return for repair or further inspection by carrier. The purchaser and Unholtz-Dickie Corporation will arrange for the replacement and/or repair of the damaged item.

Refer to our separate warranty page for a statement of our warranty policy.

2. Return Shipment

Return shipment procedure: Please be sure the following instructions are observed if a Model 22 Series instrument is being shipped back to Unholtz-Dickie for repair, replacement, or upon completion of use as a demonstrator or loaner.

2.1 Size of Box and Packing Instructions

2.1.1 Single Channel with 5¼ inch Panel Height

If the single channel was shipped from Unholtz-Dickie as an individual unit, replace the instrument in its original container. If the instrument was shipped as part of a rack mounted combination of channels, the single channel can be returned separately in a container that is no smaller than 22½ inch x 10½ inch x 9½ inch. The front and rear panels must be completely protected by approximately 2 inches of cushioning material. The top, bottom and sides must be surrounded by cushioning and filler materials. A strong, double wall type corrugated box, (350 lb/sq. in. minimum bursting test) has been proven to give adequate service. DO NOT USE A SMALLER OR WEAKER CONTAINER THAN THAT RECOMMENDED ABOVE.

Cover the painted surfaces of the instrument with protective wrapping paper or a plastic bag whenever the packing material might be coarse enough to scratch the painted surfaces.

2.1.2 Six Channel Rack with 5¼ inch Panel Height

CAUTION: Do not rest the rack type instrument in a vertical position with its weight on the rear since the connectors and switches at the rear of the instrument might be damaged.

Replace this instrument in the original container. Replace all packing pads and fillers in the exact position which they originally occupied. If the original container is no longer available, use a container that is no smaller than 27 inch x 20½ inch x 10½ inch.

It is important that protection be provided for the rear connectors and switches during shipment. A sheet of stiff cardboard should be placed under the instrument and then folded up to meet the top of the rear panel. The instrument should be bagged and surrounded on all surfaces by cushioning and filler materials. A strong, double wall type corrugated box (350 lb/sq. in. minimum bursting test) has been proven to give adequate service. DO NOT USE A SMALLER OR WEAKER CONTAINER THAN THAT RECOMMENDED ABOVE.

2.1.3 Single Channel with 8-3/4 inch Panel Height

Follow the instructions given in paragraph 2.1.1, except that extra precautions must be taken to prevent the front panel extension with its meter from being bent during shipment. The extended meter must be braced between packing material so that the load force will be distributed evenly over the entire front panel of the instrument.

2.1.4 Six Channel Rack with 8-3/4 inch Panel Height

Follow the instructions given in paragraph 2.1.2, except that the container size must be no smaller than 26½ inch x 25 inch x 13½ inch.

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